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MEMO

To: AZ RCI Technical Working Group (TWG)
CC: ADEQ staff
From: Alison Bailie, Michael Lazarus, David Von Hippel, Tellus/CCS
Re: Projected Growth Rates for AZ Electricity Sales
Date: November 22, 2005

Note to TWG Members: This memo provides an update of the memo on the same topic that was distributed prior to the 11/10 TWG call. The memo has been updated to reflect some additional information on utility forecasts complied since our earlier call. This topic will be raised briefly in the 12/1 TWG call, and the TWG will be asked to decide between the options for revising (or not revising) the existing forecast for electricity sales in Arizona. A range of options for revision are laid out at the end of this memo. The TWG's recommendation will be sent on to the 12/12 CCAG meeting, where the CCAG will make a final decision on whether or not to revise the GHG emissions forecast to reflect a different rate of electricity sales growth.

Tellus/CCS have provided a draft inventory/projection for GHG emissions by sector for Arizona (draft GHG inventory/projections), covering the period 1990-2020, to help provide technical assistance to the Climate Change Advisory Group. As part of the process, we have asked members of the Technical Working Groups to provide feedback on the methods and key assumptions in the AZ GHG inventory and projections. The RCI TWG has accepted most of the assumptions and methods used in the draft, but were concerned that the annual growth rate for electricity sales used for the GHG projections was too low.

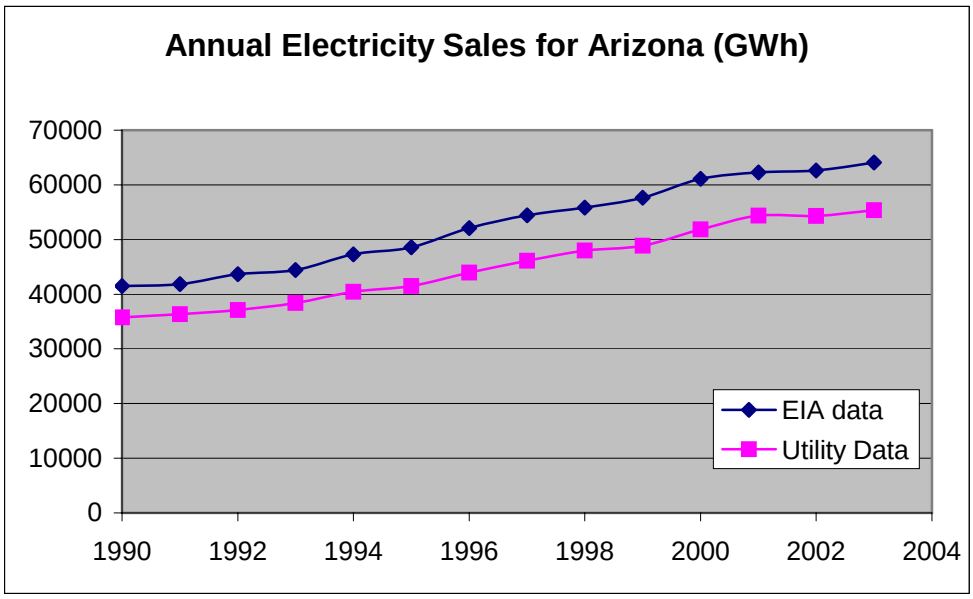
The initial assumption used in the draft GHG inventory/projection was for an annual 3% growth in electricity sales from 2003 to 2020. This value is based on a January 2005 report by the Arizona Corporation Commission (*Proposed Changes to the Environmental Portfolio Standard Rules RE-00000C-00-0377* http://www.cc.state.az.us/utility/electric/EPS-StaffRpt-01-21-05.pdf).

Another approach we have explored is to compile sales and forecast estimates directly from the electric utilities. We have requested historical data and projections from Arizona Public Service (APS), Tucson Electric Power (TEP), and Salt River Project (SRP). The information provides helpful insights but is insufficient for a bottom-up "compiled" forecast. We have annual projections to 2011 (by sector) for one utility, and rough % growth estimates for two others.

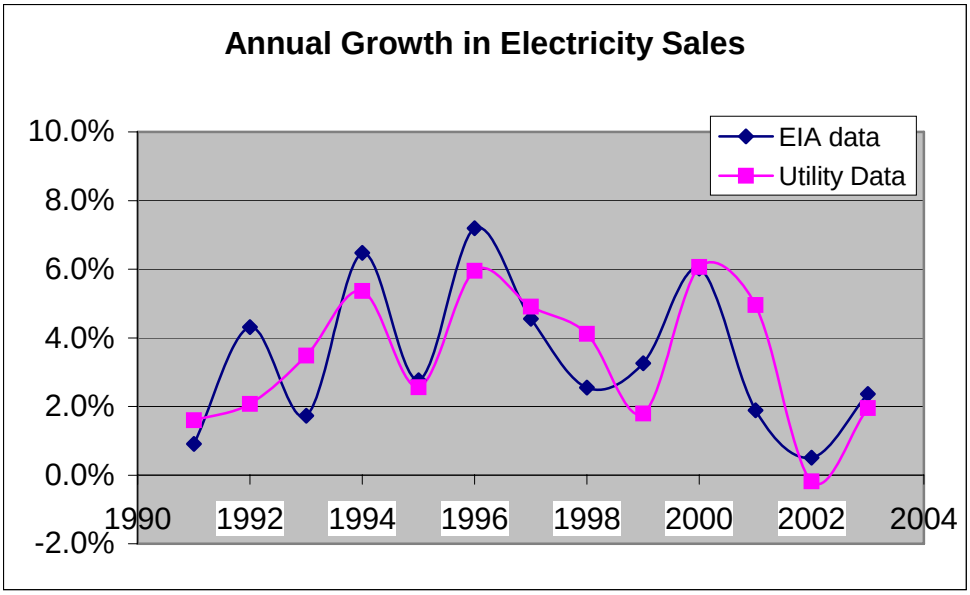
We also collected data on historic electricity sales from the Energy Information Administration and calculated projections from EIA's Annual Energy Outlook (adjusting the regional projections by Arizona's projected population and economic growth).

This memo reports the information provided by the different sources to help provide guidance for estimating an appropriate projected growth rate for electricity sales.

Electricity sales – the following chart presents the electricity sales reported by the three major utilities and by EIA for historic time period 1990-2003. The three utilities that reported do not cover the entire state's customers, in part explaining the difference between the data sources.



Electricity Use – Annual growth rates. We calculated the annual year-to-year growth rates for the period, as shown in the following chart. This demonstrates a high variability in the annual rates of change in sales. Overall, statewide electricity use grew an at average rate of 4.0%/year from 1990-2000, a decade of robust growth; when the economic slowdown of the 2001-2003 is included, 13 year average growth rate from 2000-2013 drops to 3.4%. This confirms the sensitivity of historical growth rates to the choice of the period start and end dates. Preliminary data from EIA suggest a growth rate of about 4.4% from 2003 to 2004.



The following table provides **information by utility**, with average annual growth rates from 1990 to 2000 and from 2000 to 2003.

	1990-2000					2000-2003				
	APS	SRP	TEP	3 Utilities	State (EIA)	APS	SRP	TEP	3 Utilities	State (EIA)
Residential.....	5.4%	3.9%	3.9%	4.5%	4.9%	4.5%	4.1%	3.7%	4.2%	3.7%
Commercial.....	4.4%	4.8%	2.3%	4.3%	4.2%	2.9%	3.8%	4.0%	3.3%	1.5%
Industrial.....	-0.7%	3.5%	2.6%	2.1%	1.8%	-2.6%	-3.9%	-4.8%	-3.9%	-3.0%
Irrigation.....	-6.6%	-14.0%	n/a	-9.7%	n/a	-32.6%	9.7%	n/a	-14.5%	n/a
Other	3.4%	2.5%	4.8%	3.1%	n/a	2.4%	4.2%	-1.2%	2.8%	n/a
Total retail ...	**4.0%**	**3.9%**	**3.1%**	**3.8%**	**4.0%**	**2.9%**	**2.2%**	**0.2%**	**2.2%**	**1.6%**

The upsurge in sales in 2004 (preliminary EIA data) suggests that average annual growth rates for the period 2000 to 2004 are slightly higher than those shown above for 2000-2003, at 3.0% (APS), 3.1% (SRP) and 1.0% (TEP), respectively.

The main question is: what is the most appropriate growth rate to use for 2004-2020 to inform Arizona's process for developing a set of options for reducing GHG emissions?

The utility forecasts tend to cover the period up to 2010/2011 and the information reported to Tellus/CCS is as follows:

- APS (historical growth trend over past 8 years): 3.0 to 3.2% per year (as reported by Dave Jallo in last TWG call)
- APS (forecast 2005-2007): 4.2% per year (from a recent rate case)
- SRP (through 2011): 3.7% per year
- TEP (through 2010): 3.5% to 4% per year

Across the three utilities' forecasts, the average sales-weighted growth over the next few years is 3.4%/year (using the midpoint of recent APS growth noted by Dave Jallo) or 3.7%/year (using short-term APS growth rate to 2007).

The Annual Energy Outlook 2005, produced by the EIA, provides projections of electricity sales by region (Mountain census region) to 2025. We estimated growth rates for Arizona based on the regional growth rates but adjusting for differences in population and economic growth projections for Arizona. The energy sales projections are based on bottom-up modeling that accounts for replacement of old buildings and equipment plus new purchases as the state grows. The calculated average annual growth rate estimates for electricity sales in Arizona are 3.7% per year from 2003-2010 and 2.8% per year from 2010-2020. With these growth rates, electricity sales continue to grow faster than projected population or employment growth in the state.

Options for projected annual average growth rates from 2004-2010 include

a. 3% based on ACC report (and currently used in draft inventory)
b. 3.4% based on utility-weighted growth rate (assuming APS recent historical growth)
c. 3.7% based on USDOE's Annual Energy Outlook (adjusted for AZ conditions per above) and/or on the on utility-weighted growth rate (assuming APS projection 2005-2007)
d. An alternative rate

Options for projected annual average growth rates from 2010-2020 include

a. use same rate as chosen for the earlier period as above (for simplicity)
b. 2.8% based on USDOE's Annual Energy Outlook (adjusted for AZ conditions per above); this decrease in growth is due in small part to somewhat slower Arizona population growth forecast post-2010 (1.8%/year vs. 2.1%/year before 2010), and largely to expected improvements in equipment efficiency (in response to federal standards) and building design. For more detailed discussion, see: http://www.eia.doe.gov/oiaf/aeo/demand.html.
c. An alternative rate.

The effects of a few of the possible growth rate combinations in terms of statewide sales are shown below:

Effect of Changing Electricity Sales Growth Rate on Statewide Electricity Use (TWh)

	1990	2000	2010	2020
3.0%/year growth (2003-2020) - Draft Inventory	**41.5**	**61.1**	**79.7**	**109.9**
3.4%/year growth (2003-2020)			82.1	118.2
3.7%/year growth (2003-2020)			83.9	124.9
3.7%/year growth (2003-2010); 2.8%/year (2010-2020)			83.9	113.4